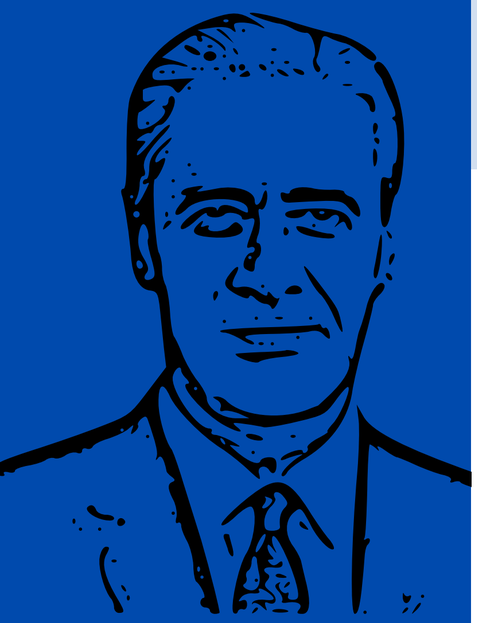
DEPARTMENT OF PHYSICS, SVNIT

brings to you

QUANTA SEMINAR

on

Dhawan *Session*



Effects of Extra-Dimensions on Force Fields and Particles

Adithya A Rao

Saturday, 27 Aug 2022

06:00 PM onwards

DoP, Room-008

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Contact Us

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Outline of The Talk

- Dimensions
- Extra Dimensions
  - What are they?
  - Why do we need extra dimensions?
  - How can they exist?
- Extra dimensions and their effect on force fields
- Effect of extra dimensions on particles
- Concluding remarks.

Dimensions

- 1 dimensional world

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- 2 and 3 dimensional world

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- 2 and 3 dimensional world
- How time is a dimension.
- How is time different from the 3 dimensions of space?
- Spin, GPA and et cetera
- So what defines physical dimension?

Extra dimensions

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- How can they exist without our knowledge?

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  - Other mathematical possibilities.

Extra dimensions

- What are they?
- Why do we need them?
- How can they exist without our knowledge?
  - Small dimension scenario
  - Constrained observer scenario
  - Other mathematical possibilities.
- Are we constantly accessing extra dimensions without our knowledge?

Effect on Fields

- Gauss law and et cetera

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- Finite dimension case.

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- Finite extra dimension case.
- Do elelctromagnetic fields live in extra dimensional world?

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- Do elelctromagnetic fields live in extra dimensional world?
- Why gravity might be different?

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Classically

- Lets get back our old friends in the story - the ship and the boat in the canal.

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- Mass vs other properties $\longrightarrow$ Kaluza Klein Partners

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- Mass vs other properties $\longrightarrow$ Kaluza Klein Partners
- Only half the story.

Effect on Particles

Quantum World

- Finite dimensions $\longrightarrow$ Boundary conditions.

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- Quantization $\longrightarrow$ Only specific modes allowed
- Discrete set of allowed masses, rest all properties same.
- Ring some bells? The 3 generations of standard model.

Concluding Remarks

• Simple mathematics, possible to bring in wierder constraints and get some interesting stuff out from the theories.

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- Geometrization of Electromagnetic Fields.

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- Some interesting possibilites one can get from extra dimensions $\longrightarrow$
  - Dark Energy
  - Dark Matter
  - Neutrino Mass Problem
  - The Hierarchy Problem and the Low strength of Gravity
  - Geometrization of Electromagnetic Fields.
- Requirements for a physical theory with extra dimensions.